

NSRP -SPC-SP 8

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NSRP 0186

71199

FINAL REPORT
for

TEMPORARY STAGING
for
SHIPYARDS



Prepared for

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MarAd Task ES-8-15
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July, 1983

Report Documentation Page			Form Approved OMB No. 0704-0188		
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1. REPORT DATE JUL 1983	2. REPORT TYPE N/A	3. DATES COVERED -			
4. TITLE AND SUBTITLE Temporary Staging for Shipyards			5a. CONTRACT NUMBER		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center CD Code 2230 - Design Integration Tools Building 192 Room 128 9500 MacArthur Bldg Bethesda, MD 20817-5700			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF: a. REPORT b. ABSTRACT c. THIS PAGE unclassified unclassified unclassified			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 32	19a. NAME OF RESPONSIBLE PERSON

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SECTION 1
FINAL REPORT - INTRODUCTION

1.1 INTRODUCTION

A. SCOPE

This report shows the application of the labor standards for staging developed in Phase II. The application of the standards will be on an Integrated Tug-Barge (ITB) and will be used for the purpose of production control.

B. TYPES OF STAGING

There are several types of staging that apply to the ITBs. The types of staging and the areas that they apply to are listed below

1. CENTER TANK

There are five (5) center tanks on an ITB, three are 100' x 50' and the remainins two are 85' x 50'+ The staging is erected from within the tank using a grove crane. Three carpenters are in the tank. one handles the material. the other two erect the staging,

a. Smooth Bulkhead

Two board or three board bracket staging is used on smooth bulkheads. (see fig. 1)

. b. Bulkheads with Floors

The floors on these bulkheads are approximtely 20' x 50' and are connected be inclined stairways. Bracket staging is locatecl at the floor level and below the floor level. (see fig. 2 & 3)
Two board bracket staging is usualls used for this type of staging

c. Tank Staging Platform (see fig. 4)

A tank staging platform is used for easy access to the area below the main deck. The platform is assembled in a platen area and then placed in the center tank of the ship. Tower cranes are used to transport the tank staging platforms from the platen area to the ship. After the main deck is erected, the tank staging platform is raised (by tower crane) and secured to the main deck. The tank staginl platforms are approximately 35'x20' and there are two per tank. The tank staging platforms are connected by three board bracket staging.

d. Boards beneath the main deck

Boards are spread beneath the. main deck from the tank staging platform to existing bracket staging+ This allows mechanics to move about freely under the main deck.

FINAL REPORT - INTRODUCTION

SKETCHES

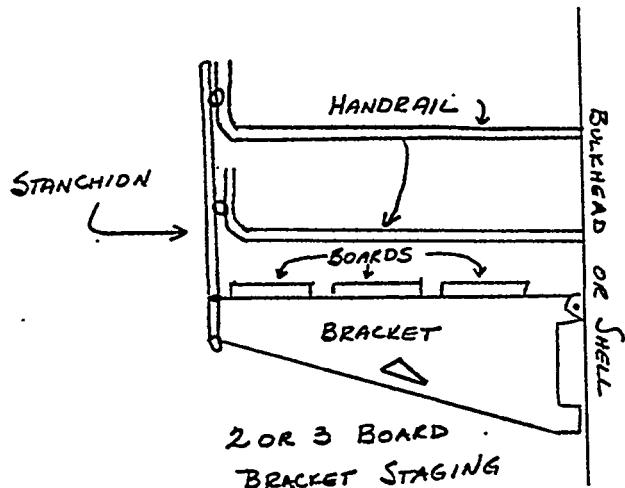


FIGURE 1

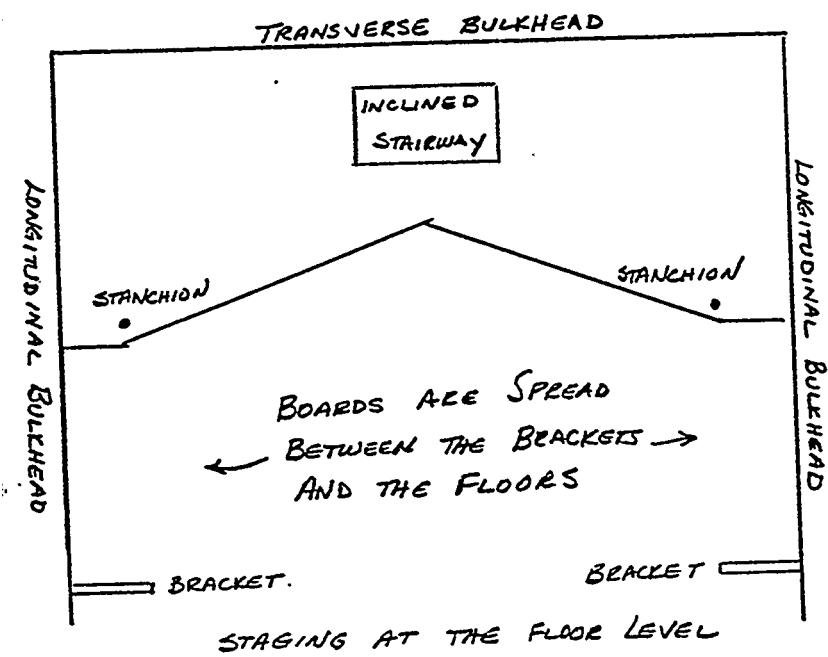


FIGURE 2

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FINAL REPORT - INTRODUCTION

2. WING TANK

There are five (5) wins tanks on each side of an ITB, three are 100' x 30' and the remeinins two are $\frac{1}{2}$ 5' x 30'. The staging is erected using the tower cranes. There are three carpenter, one is located at the material and the other two erect the staging in the wins tank.

a. Smooth Bulkhead

Similar to the center tank

b. Bulkheads with Floors .

Similar to the center tank

c. Bulkheads with Webs

Bracket staging, either two or three board, is installed to the webs, Staging boards are spread from the bracket. staging to the inboard or outboard bulkheads (see fig. 5)

3. EXTERIOR SHELL

On the ITBs the only staging needed on the exterior shell is at the bow and the stern of the ship, The staging is either two or three board bracket staging. There are three carpenters who erect the staging from an aerial platform. The aerial platform is held in place by a tower crane.

4. PIPE STAGING (see fig. 6)

Pipe staging is used at the bilge level of the exterior side shell. The pipe steging is two levels high and consists of two 16' sections connected by a span of boards.

C. LAYOUT OF THE SHIP (see fig. 7)

The diagram shows a side view and plan view of an ITB.

D. DIFFERENCES

The sub-ops that were developed in phase II were based on a vessel being built on a way. The vessel we are currently constructing is being built in a building basin. The basic differences in the areas is the distance that the crane has to travel from the material to the ship. Our data has been massaged to account for these differences by creating new work areas and applying our existing sub-ops to them.

FINAL REPORT - INTRODUCTION

SKETCHES

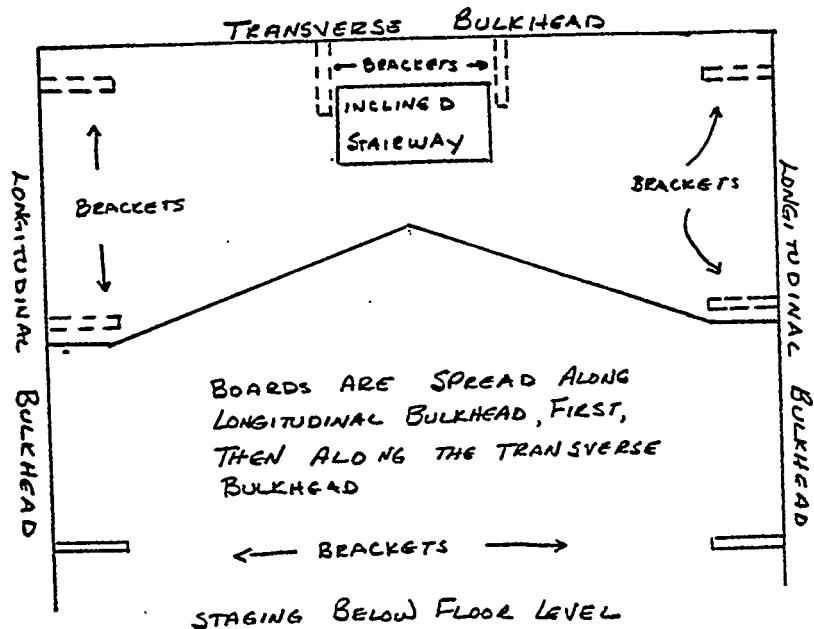


FIGURE 3

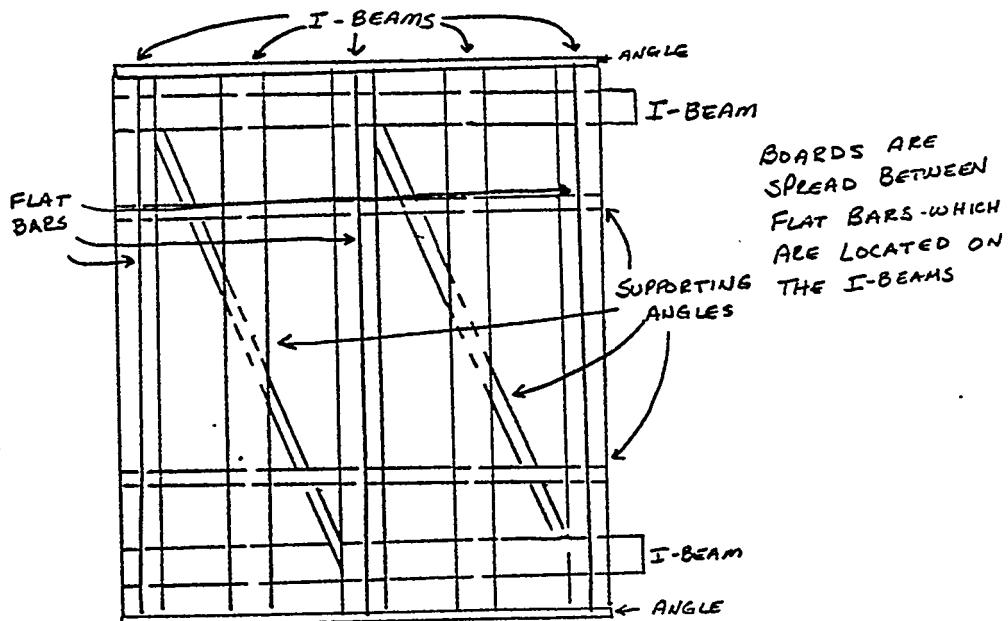
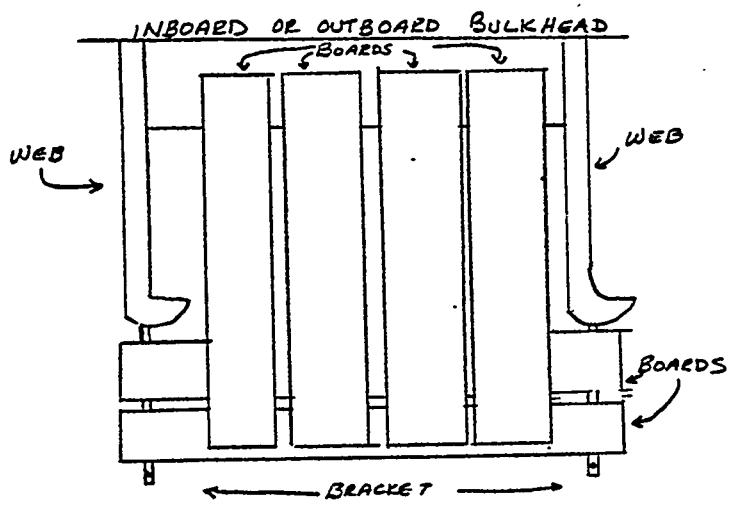


FIGURE 4

FINAL REPORT - INTRODUCTION

SKETCHES



BRACKET STAGING ON WEBS
IN WING TANK

FIGURE 5

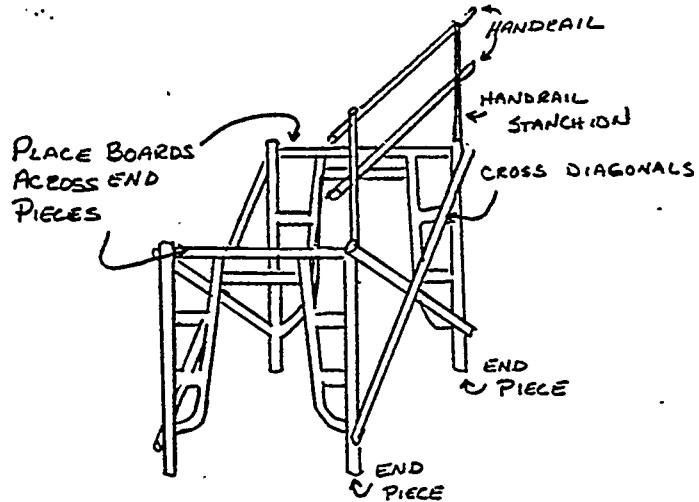
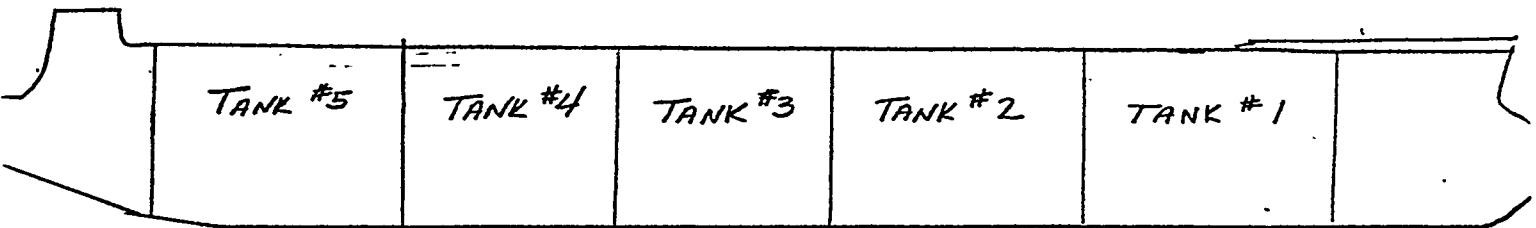


FIGURE 6

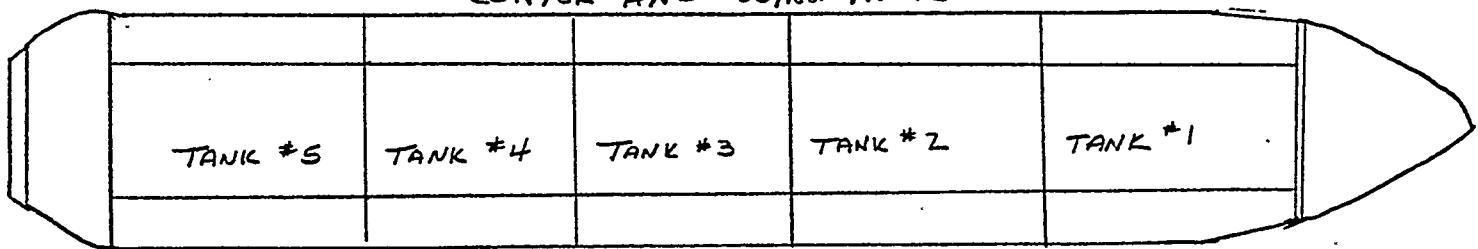
FINAL REPORT - INTRODUCTION

SKETCHES



SIDE VIEW

CENTER AND WING TANKS



PLAN VIEW

FIGURE 7.

SECTION 2
FINAL REPORT - APPLICATION OF STANDARDS

2,1 APPLICATION

A. SCOPE

A catalog of the engineered labor standards has been established for the production control department. This catalog includes the type of staging, the applicable rates and the amount of staging material needed.

B. CATALOG

The catalog is divided into three sections: (1) Set-up, (2) Tear downs and (3) Material needed.

SECTION 1 - SET-UP		APPLICABLE RATE
TYPE OF STAGING		
10 CENTER TANK		
a. Smooth bulkhead:	2 board	2.187/100 lin. ft.
	: 3 board	2.356/100 lin. ft.
b. Bulkhead with floors:	at floor	1.993/100 lin. ft.
	: below floor	2.395/100 lin. ft.
c. Tank staging platform		0.697/100 SR. ft
d. Connections of 2 tank staging platforms		7+157/100 lin. ft.
e. Boards beneath the main deck		7.360/100 lin. ft.
2. WING TANK		
a. Webs:	2 board	3.362/100 lin. ft.
b. Smooth bulkhead:	2 board	2.414/100 lin. ft.
c. Bulkhead with floors:	at floor	3.330/100 lin. ft.
	: below floor	2.396/100 lin. ft.
3. EXTERIOR SHELL		
a. Bracket staging:	2 board	2.853/100 lin. ft.
4. PIPE STAGING		
a. At side shell		6.954/100 lin. ft.

FINAL REPORT - APPLICATION OF STANDARDS

SECTION 2 - TEAR DOWN TYPES OF STAGING	APPLICABLE RATE
1, CENTER TANK	
a. Smooth bulkhead: 2 board : 3 board	1.67/100 lin.ft 1.464/100 lin. ft.
b, Bulkhead with floors: at floor : below floor	1.236/100 lin. ft. 1.447/100 li. ft.
c. Tank stasins platform	0.583/100 sq. ft.
d. Connections of 2 tank stasins platforms	2.132/100 lin. ft.
e, Boards beneath the main deck	1.530/100 lin.ft.
2. WING TANK	
a Webs: 2 board	2.268/100 lin. ft.
b. Smooth bulkheed: 2 board	1.326/100 lin. ft.
c. Bulkhead with floors: at floor : below floor	2.283/100 lin. ft. 1.497/100 lin. ft.
3. EXTERIOR SHELL	
a. Bracket stagins: 3 board	1.354/100 lin. ft.
4. PIPE STAGING	
a. At side shell	8.140/100 lin. ft.

FINAL REPORT - APPLICATION OF STANDARDS

SECTION 3 - MATERIAL NEEDED*						
	TYPE OF STAGING	BRACKETS	STANCHIONS	BOARDS	HANDRAIL	LADDERS
1. CENTER TANK						
a. Smooth bulkhead						
(2 board	6	6	10	12	2	
3 board	6	6	15	12	2	
b. Bulkhead with floors						
at floor	6	12	12	12		
below floor	8	8	14	12	2	
c. Connection of two						
Platforms	6		32			
d. Boards beneath deck			300			
2. WING TANK						
a. Webs	6	6	34	12	1	
b. Smooth Bulkhead	6	6	10.	14	1	
c. Bulkhead with floors						
at floor	6	6	40	10		
below floor	6	6	20	10		
3. EXTERIOR SHELL	8	8	21	14	2	
4. PIPE STAGING	END PIECES	BRACES	BOARDS	STANCHIONS	HANDRAIL	
	18	24	24	6	6	
5. TANK STAGING PLATFORM	I-BEANS	ANGLES	BOARDS	NUTS 8 BOLTS		
	12x8: 2	3x3: 2	64	144		
	12x6 1/2: 5	4x4: 2				

NOTE: There is one stasins clip and one nut and bolt per staging bracket. There is 4 ladder clips per ladder. There are 2 nuts and bolts per two level pipe staging.

* Material needed is based on 100 linear feet of bracket stasins. The tank staging platform material is based on buildins one 35' by 70' platform.

FINAL REPORT - APPLICATION OF STANDARDS

2.2 WORKSHEETS FOR PRODUCTION CONTROL

A. SCOPE

Worksheets have been developed for use by the production control department. These worksheets are used to determine the unit Productive hours, manhours and the amount of the material needed. There are four worksheets: (1) Unit Productive hours - by area (ie. center tenk, etc.,), (2) Manhours - by area, (3) Summary of unit productive hours, and (4) Summary of manhours.

The followins section shows examples of how the worksheets can be used on an Integrated Tug-Barge.

FINAL REPORT - APPLICATION OF STANDARDS

WORKSHEETS FOR PRODUCTION CONTROL
UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL

AREA OF SHIP: TYPE OF STAGING	AMOUNT	DATE: RATE	UNIT FROD. HOURS
A. SET-UP			
1.			
2.			
3.			
4.			
5.			
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			
B. TEAR DOWN			
1.			
2.			
3.			
4.			
5.			
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOUN			
C. MATERIAL NEEDED			
BRACKETS		END PIECES:	
STANCHIONS:		BRACES :	
BOARDS :		I-BEAMS - 12x8: - 12x6 1/2:	
HANDRAIL:		ANGLES - 3X3: - 4X4:	
LADDERS:		NUTS/BOLTS:	
STAGING CLIPS:			
LADDER CLIPS:			

FINAL REPORT - APPLICATION OF STANDARDS

WORKSHEETS FOR PRODUCTION CONTROL
MANHOURS - BY AREA

PRODUCTION CONTROL

AREA OF SHIP: TYPE OF STAGING	DATE:	UNIT PROD. HOURS	# MEN* MANHOURS
A. SET-UP			
1.			
2.			
3.			
4.			
5.			

TOTAL MANHOURS: SET-UP

B. TEAR DOWN

- 1.
- 2.
- 3.
- 4.
- 5.

TOTAL MANHOURS: TEAR DOWN

* # MEN includes the number of carpenters and welders needed to do the Job. There is usually one welder and the number of carpenters can be found in the Back-up Data on page 327

FINAL REPORT - APPLICATION OF STANDARDS

WORKSHEETS FOR PRODUCTION CONTROL
UNIT PRODUCTIVE HOURS - SUMMARY

PRODUCTION CONTROL

TYPE OF SHIP:	DATE:
AREA OF SHIP	UNIT PROD. HOURS # AREAS* TOTAL HOURS
A. SET-UP	
1.	
2.	
3.	
4.	
!5.	
TOTAL UNIT PRODUCTIVE HOURS: SET-UP	
B. TEAR DOWN	
1.	
2.	
3.	
4.	
5.	
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN	
C. TOTAL MATERIAL NEEDED :	
BRACKETS:	END PIECES:
STANCHIONS:	BRACES
BOARDS:	I-BEAMS - 12x8: - 12X6 1/2:
HANDRAIL	
LADDERS:	ANGLES - 3x3: - 4x4:
STAGING CLIPS:	
LADDER CLIPS:	NUTS/BOLTS:

* # AREAS: There are 5 center tanks, 3 are 100'x50' and 2 are 85'x50',
There are 10 wins tanks 06 are 100'x30' and 4 are 85'x30'.

FINAL REPORT - APPLICATION OF STANDARDS

WORKSHEETS FOR PRODUCTION CONTROL
MANHOURS - SUMMARY

PRODUCTION CONTROL

TYPE OF SHIP: AREA OF SHIP	MANHOURS	DATE: # AREAS*	TOTAL HOURS
A. SET-UP			
1.			
2.			
3.			
4.			
5.			
	TOTAL MANHOURS: SET-UP		
B. TEAR DOWN			
1.			
2.			
3.			
4.			
5.			
	TOTAL MANHOURS: TEAR DOWN		

* # AREAS: There are 5 center tanks, 3 are 100'x50' and 2 are 85'x50'.
There are 10 wins tanls, 6 are 100'x30' and 4 are 85'x30'.

SECTION 3
FINAL REPORT - EXAMPLES OF APPLICATION

3.1 WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL				
AREA OF SHIP: CENTER TANK (1,2,5)		DATE: JUNE, 1983		
TYPE OF STAGING	AMOUNT	RATE	UNIT PROD. HOURS	
A. SET-UP				
1. SMOOTH BULKHEAD				
2 BOARD	1200 FT	2.187	26.2	
3 BOARD	450 FT	2.356	10.6	
2. BULKHEAD WITH FLOORS				
AT FLOOR	120 FT	1.993	2.4	
BELOW FLOOR	260 FT	2.395	6.2	
3. TANK STAGING PLATFORM	1400 SQ FT	0.697	9.8	
4. CONNECTIONS OF 2 TANK				
STAGING PLATFORMS	20 FT	7.157	1.4	
5. BOARDS BENEATH DECK	300 FT	7.360	22.1	
TOTAL UNIT PRODUCTIVE HOURS: SET UP				78.7
B. TEAR DOWN				
1. SMOOTH BULKHEAD				
2 BOARD	1200 FT	1.267	15.2	
3 BOARD	450 FT	1.464	6.6	
2. BULKHEAD WITH FLOORS				
AT FLOOR	120 FT	1.236	1.5	
BELOW FLOOR	260 FT	1.447	3.8	
3. TANK STAGING PLATFORM	1400 SQ FT	0.583	8.2	
4. CONNECTIONS OF 2 TANK				
STAGING PLATFORMS	20 FT	2.132	0.4	
5. BOARDS BENEATH DECK	300 FT	1.530	4.6	
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN				40.3
C. MATERIAL NEEDED				
BRACKETS - 2 BOARD: 104			END PIECES: -	
- 3 BOARD: 22				
STANCHIONS: 126			BRACES: -	
BOARDS: 678			I-BEAM - 12x8: 4	
HANDRAIL: 222			- 12x6 1/2: 10	
LADDERS: 40			ANGLES - 3x3: 4	
STAGING CLIPS: 126			- 4x4: 4	
LADDER CLIPS: 160			NUTS/EOLTS: 392	

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL AREA OF SHIP: CENTER TANK (3.4)		DATE: JUNE, 1983	
TYPE OF STAGING	AMOUNT	RATE	UNIT PROD. HOURS
A. SET-UP			
1 SMOOTH BULKHEAD			
2 BOARB	990 FT	2.187	21.7
3 BOARD	420 FT	2. 356	9.9
2. BULKHEAD WITH FLOORS			
AT FLOOR	120 FT	1.993	2.4
BELOW FLOOR	260 FT	2.395	6.2
30 TANK STAGING PLATFORM	1400 SQ FT	0.697-	9.8
4. CONNECTIONS OF 2 TANK			
STAGING PLATFORMS	20 FT	7.157	1.4
!3. BOARDS BENEATH DECK	300 FT	7.360	22.1
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			73.5
B. TEAR DOWN			
1. SMOOTH BULKHEAD			
2 BOARD	990 FT	1.267	12.5
3 BOARD	420 FT	1.1 464	6.1
2. BULKHEAD WITH. FLOORS			
AT FLOOR	120 FT	1.236	1.5
BELOW FLOOR	260 FT	1.447	3.8
3. TANK STAGING PLATFORM	1400 SQ FT	0.583	8.2
4. CONNECTIONS OF 2 TANK			
STAGING PLATFORMS	20 FT	2.132	0.4
5. BOARDS BENEATH DECK	300 FT	1.530	4.6
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			37.1
C. MATERIAL NEEDED			
BRACKETS - 2 BOARD: 80		END PIECES:	
- 3 BOARD: 18			
STANCHIONS: 102		I-BEAMS - 12x8: 4	
BOARDS: 612		-12x6 1/2: 10	
LADDERS: 40		ANGLES - 3x3: 4	
STAGING CLIPS: 98		- 4x4: 4	
LADDER CLIPS: 160		NUTS/BOLTS: 368	

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL AREA OF SHIP: WING TANK (1,2,5)		DATE: JUNE. 1983	
TYPE OF STAGING	AMOUNT	RATE	UNIT PROD. HOURS
A. SET-UP			
1. WEBS	1120 FT	3.362	37.7
2. SMOOTH BULKHEAD	300 FT	2.414	7.2
3. BULKHEAD WITH FLOORS			
AT FLOOR	250 FT	3.350	8.4
BELOW FLOOR	250 FT	2.396	6.0
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			59.3
B. TEAR DOWN			
1. WEBS	1120 FT	2.268	25.4
2. SMOOTH BULKHEAD	300 FT	1.326	4.0
3. BULKHEAD WITH FLOORS			
AT FLOOR	250 FT	2.283	5.7
BELOW FLOOR	250 FT	1.497	3.7
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			38.8
C. MATERIAL NEEDED			
BRACKETS - 2 BOARD: 106.		END PIECES: -	
STANCHIONS: 106		BRACES: -	
BOARDS: 560		I-BEAMS - 12x8: -	
HANDRAIL: 226		- 12X6 1/2:	
LADDERS: 21		ANGLES - 3x3: -	
STAGING CLIPS: 92		- 4x4: -	
LADDER CLIPS: 84		NUTS/BOLTS: 106	

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: WING TANK (3,4) DATE: JUNE, 1983

TYPE OF STAGING	AUOUNT	RATE	UNIT PROD. HOURS
A. SET-UP			
1. WEBS	900 FT	3.362	30.3
2. SMOOTH BULKHEAD	300 FT	2.414	7.2
3. BULKHEAD WITH FLOORS			
AT FLOOR	250 FT	3.350	B. 4
BELOW FLOOR	250 FT	2.396	6.0
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			51.9
B. TEAR DOWN			
1. WEBS	900 FT	2.268	20.4
2. SMOOTH BULKHEAD	300 FT	1.326	4.0
3. BULKHEAD WITH FLOORS			
AT FLOOR	250 FT	2.283	5.7
BELOW FLOOR	250 FT	1.497	3.7
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			33.8
C. MATERIAL NEEDED			
BRACKETS - 2 BOARD: 92		END PIECES: -	
STANCHIONS: 92		BRACES: -	
BOARDS: 486		I-BEAMS - 12x8: -	
HANDRAIL: 200		- 12X6 1/2: -	
LADDERS: 21		ANGLES - 3x3: -	
STAGING CLIPS: 92		0- 4x4: -	
LADDER CLIPS: 84		NUTS/BOLTS: 92	

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL			
AREA OF SHIP: EXTERIOR SHELL		DATE: JUNE. 1983	
TYPE OF STAGING	AMOUNT	RATE	UNIT PROD. HOURS
A. SET-UP			
1. BRACKET STAGING			
BOW	960 FT	2.855	27.4
STERN	3700 FT	2.855	105.6
20 PIPE STAGING	1100 FT	6.954	76+S
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			209.5
B. TEAR DOWN			
1. BRACKET STAGING			
Bow	960 FT	1.354	13.0
STERN.	3700 FT	1.354	50.1
2. PIPE STAGING	1100 FT	8 . 1 4 0	8 9 . 5
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			152.6
C. MATERIAL NEEDED			
BRACKET STAGING - 3 BOARD: 374		END PIECES:	19S
STANCHIONS: 440		BRACES:	264
BOARDS: 1244		I-BEAMS - 12x8:	
HANDRAIL: 716		- 12X6 1/2:	
LADDERS: 94		ANGLES - 3x3:	
STAGING CLIPS: 374		- 4x4: -	
LADDER CLIPS: 376		NUTS/BOLTS: 814	

FINAL REPORT - EXAMPLES OF APPLICATION

3.2 WORKSHEET: MANHOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: CENTER TANK (1,2,5) DATE: JUNE, 1983

TYPE OF STAGING	UNIT PROD.	HOURS	# MEN*	MANHOURS
A. SET-UP				
1. SMOOTH BULKHEAD				
2 BOARD	26.2		4	104.8
3 BOARD	10.6		4	42.4
2. BULKHEAD WITH FLOOR				
AT FLOOR	2.4		4	9.6
BELOW FLOOR	6.2		4	24.8
3. TANK STAGING PLATFORM	9.8		2	19.6
4. CONNECTIONS OF 2 TANK STAGING PLATFORMS	1.4		3	4.2
5. BOARDS BENEATH DECK	22.1		2	44.2
TOTAL MANHOURS: SET-UP				249.6
B. TEAR DOWN				
1. SMOOTH BULKHEAD				
2 BOARD	15.2		6	91.2
3 BOARD	6.6		6	39.6
2. BULKHEAD WITH FLOORS				
AT FLOOR	1.5		6	9.0
BELOW FLOOR	3.8		6	22.8
3. TANK STAGING PLATFORM	8.2		6	49.2
4. CONNECTIONS OF 2 TANK STAGING PLATFORMS	0.4		6	2.4
5. BOARDS BENEATH DECK	4.6		6	27.6
TOTAL HANHOURS: TEAR DOWN				241.8

X # MEN includes the number of carpenters and welders needed to do the job. There is usually one welder (except for tank staging platforms and boards beneath the deck) and the number of carpenters can be found in the Rack-up Data on page 327.

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: MANHOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: CENTER TANK (3,4) DATE: JUNE, 1983

TYPE OF STAGING	UNIT PROD, HOURS	# MEN*	MANHOURS
A. SET-UP			
1. SMOOTH BULKHEAD			
2 BOARD	21.7	4	86.8
3 BOARD	9.9	4	39.6
2. BULKHEAD WITH FLOORS			
AT FLOOR	2.4	4	9.6
BELOW FLOOR	6.2	4	24.8
3. TANK STAGING PLATFORM	9.8	2	19.6
4. CONNECTIONS OF 2 TANK STAGING			
STAGING PLATFORMS	1.4	3	4.2
5. BOARDS BENEATH DECK	22.1	2	44.2
TOTAL MANHOURS: SET-UP			228.8
B. TEAR DOWN			
1. SMOOTH BULKHEAD			
2 BOARD	12.5	6	75.0
3 BOARD	6.1	6	36.6
2. BULKHEAD WITH FLOORS			
AT FLOOR	1.5	6	9.0
BELOW FLOOR	3.8	6	22.8
3. TANK STAGING PLATFORM	8.2	15	49.2
4. CONNECTIONS OF 2 TANK			
STAGING PLATFORMS	0.4	6	2.4
5. BOARDS BENEATH DECK	4.6	6	27.6
TOTAL MANHOURS: TEAR DOWN			222.6

* # MEN includes the number of carpenters and welders needed to do the job. There is usually one welder (except for tank stasins platforms and boards beneath the deck) and the number of carpenters can be found in the Back-up Data on Page 327.

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: MANHOURS - BY AREA

PRODUCTION CONTROL AREA OF SHIP: WING TANK (1,2,5)		DATE: JUNE, 1983		
TYPE OF STAGING		UNIT PROD.	HOURS	# MEN* MANHOURS
A. SET-UP				
10 WEBS		37.7		4 150.8
2. SMOOTH BULKHEAD		7.2		4 28.13
3. BULKHEAD WITH FLOORS				
AT FLOOR		8.4		4 33.6
BELOW FLOOR		6.0		4 24.0
TOTAL MANHOURS: SET-UP				237.2
B. TEAR DOWN				
1. WEBS		25.4		6 152.4
2. SMOOTH BULKHEAD		4.0		6 24.0
3. BULKHEAD WITH FLOORS				
AT FLOOR		5.7		6 34.2
BELOW FLOOR		3.7		6 22.2
TOTAL MANHOURS: TEAR DOWN				232.8

* # MEN includes the number of carpenters and welders needed to do the job. There is usually one welder and the number of carpenters can be found in the Back-up Date on page 327.

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: MANHOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: WING TANK (3,4) DATE: JUNE, 1983

TYPE OF STAGING	UNIT PROD.	HOURS	# MEN*	HANHOURS
A. SET-UP				
1. WEBS	30.2		4	121.2
2. SMOOTH BULKHEAD	7.2		4	28.8
3. BULKHEAD WITH FLOORS				
AT FLOOR	8.4		4	33.6
BELOW FLOOR	6.0		4	24.0
TOTAL MANHOURS: SET-UP				207.6
B. TEAR DOWN				
1. WEBS	20.4		6	122.4
2. SMOOTH BULKHEAD	4.0		6	24.0
3. BULKHEAD WITH FLOORS				
AT FLOOR	5.7		6	34.2
BELOW FLOOR	3.7		6	22.2
TOTAL MANHOURS: TEAR DOWN				202.8

MEN includes the number of carpenters and welders needed to do the job. There is usually one welder and the number of carpenters can be found in the Back-IP Data on Page 327.

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: MANHOURS - BY AREA

TYPE OF STAGING	UNIT	PROD.	HOURS	# MEN*	HANHOURS
A. SET-UP					
1. BRACKET STAGING					
BOW		27.4		4	109.6
STERN		105.6		4	422 . 4
2. PIPE STAGING		76.5		4	306.0
TOTAL MANHOURS: SET-UP					838.0
B. TEAR DOWN					
1. BRACKET STAGING					
BOW		13.0		3	39.0
STERN		50.1		3	150.3
20 PIPE STAGING		89.5		3	268.S
TOTAL MANHOURS: TEAR DOWN					457.8

MEN includes the number of carpenters and the welders needed to do the job. There is usually one welder and the number of carpenters can be found in the Back-up Data on page 327.

FINAL REPORT - EXAMPLES OF APPLICATION

3.3 WORKSHEET: UNIT PRODUCTIVE HOURS - SUMMARY

PRODUCTION CONTROL
 TYPE OF SHIP: INTEGRATED-TUG-BARGE DATE: JUNE, 1983

AREA OF SHIP	UNIT PROD.	HOURS #	AREAS*	TOTAL HOURS
A. SET-UP				
1. CENTER TANK (1,2,5)	79.7	3		236.1
2. CENTER TANK (3,4)	73.5	2		147.0
3. WING TANK (1,2,5)	59.3	6		355.8
4. WING TANK (3,4)	38.8	4		155.2
5. EXTERIOR SHELL	209.5	1		209.5
TOTAL UNIT PRODUCTIVE HOURS: SET-UP				1103.6
R. TEAR DOWN				
1. CENTER TANK (1,2,5)	40.3	3-		120.9
2. CENTER TANK (3,4)	37.1	2		74.2
3. WING TANK (1,2,5)	51.9	6		311.4
4. WING TANK (3,4)	33.8	4		135.6
5. EXTERIOR SHELL	152.6	1		152.6
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN				794.3
C. TOTAL MATERIAL NEEDED				
BRACKETS - 2 BOARD: 974			END PIECES: 198	
- 3 BOARD: 476				
STANCHIONS: 1524			BRACES: 264	
ROARDS: 7154			I-BEAMS - 12x8: 20	
HANDRAIL: 2848			- 12X6 1/2: 50	
LADDERS: 399			ANGLES - 3x3: 20	
STAGING CLIPS: 1450			- 4x4: 20	
LADDER CLIPS: 1595			NUTS/BOLTS: 3S96	

* # AREAS: There are 5 center tanks, 3 are 100'x50' and 2 are 85'x50'.
 There are 10 wing tanks, 6 are 100'x30' and 4 are 85'x30'.
 Exterior shell consists of bracket stanchions on the shell (at bow and stern) and pipe staging at the side shell.

FINAL REPORT - EXAMPLES OF APPLICATION

3.4 WORKSHEET: MANHOURS - SUMMARY

PRODUCTION CONTROL
TYPE OF WORK: INTEGRATED TUG-BARGE DATE: JUNE, 1983

AREA OF SHIP	MANHOURS	# AREAS*	TOTAL HOURS
A. SET-UP			
1. CENTER TANK, ('1,2,5)	249.7	3	749.1
2. CENTER TANK, (3,4)	228.8	2	457.6
3. WING TANK (1,2,5)	237.2	6	1423.2
4. WING TANK (3,4)	207.6	4	830.4
5. EXTERIOR SHELL	838.0	1	838.0
TOTAL MANHOURS: SET-UP			4298.5
B. TEAR DOWN			
1. CENTER TANK (1,2,5)	241.8	3	725.4
2. CENTER TANK (3,4)	228.6	2	457.2
3. WING TANK (1,2,5)	232.8	6	1396.8
4. WING TANK (3,4)	202.8	4	811.2
5. EXTERIOR SHELL	457.8	1	457.8
TOTAL MANHOURS: TEAR DOWN			3948.4

* # AREAS: There are 5 center tanks, 3 are 100'x50' and 2 are 85'x50'.
 There are 10 wing tanks, 6 are 100'x30' and 4 are 85'x50'.
 Exterior shell consists of bracket stanchions on the shell (at bow and stern) and pipe staging at the side shell

SECTION 4
FINAL REPORT - SUMMARY

4.1 SUMMARY

The worksheets that were developed for this final report and the information that they contains will be very useful to several departments in the shipyard. For example: (1) Production control: for scheduling and manpower leveling; (2) Carpenter department: for manpower scheduling and material ordering; (3) Industrial Engineering: for incentive development and progress; and (4) Estimating: for use in estimating new work.

All of the necessary back-up data is included with this report. The back-up data consists of the following: (1) Work areas, (2) Manual methods, (3) Titlesheets, (4) Time standards, and (5) Method analysis.

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